

MOSFET – P-Channel, QFET®

-100 V, -16.5 A, 190 mΩ

FQP17P10

General Description

This P-Channel enhancement mode power MOSFET is produced using onsemi's proprietary planar stripe and DMOS technology. This advanced MOSFET technology has been especially tailored to reduce on-state resistance, and to provide superior switching performance and high avalanche energy strength. These devices are suitable for switched mode power supplies, audio amplifier, DC motor control, and variable switching power applications.

Features

- -16.5 A, -100 V, $R_{DS(on)} = 190 \text{ m}\Omega$ (Max.) at $V_{GS} = -10 \text{ V}$, $I_D = -8.25 \text{ A}$
- Low Gate Charge (Typ. 30 nC)
- Low C_{RSS} (Typ. 100 pF)
- 100% Avalanche Tested
- 175°C Maximum Junction Temperature Rating
- This is a Pb-Free Device

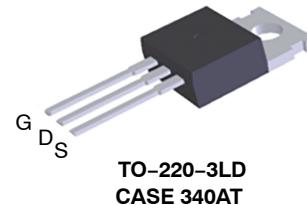
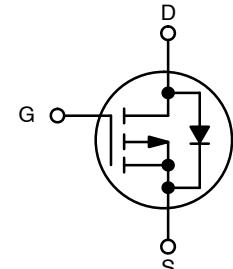
ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

Symbol	Parameter		Ratings	Unit
V_{DSS}	Drain-Source Voltage		-100	V
I_D	Drain Current	Continuous (T _C = 25°C)	-16.5	A
		Continuous (T _C = 100°C)	-11.7	
I_{DM}	Drain Current	Pulsed (Note 1)	-66	A
V_{GSS}	Gate-Source Voltage		± 30	V
E_{AS}	Single Pulse Avalanche Energy (Note 2)		580	mJ
I_{AR}	Avalanche Current (Note 1)		-16.5	A
E_{AR}	Repetitive Avalanche Energy (Note 1)		10	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)		-6.0	V/ns
P_D	Power Dissipation (T _C = 25°C)	100	W	
		Derate above 25°C	0.67	W/°C
T _J , T _{STG}	Operating and Storage Temperature Range		-55 to +175	°C
T _L	Maximum Lead Temperature for Soldering, 1/8" from Case for 5 Seconds		300	°C

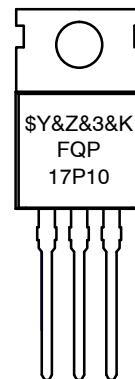
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Repetitive rating: pulse-width limited by maximum junction temperature
2. L = 3.2 mH, $I_{AS} = -16.5 \text{ A}$, $V_{DD} = -25 \text{ V}$, $R_G = 25 \Omega$, Starting T_J = 25°C
3. $I_{sp} \leq -16.5 \text{ A}$, $di/dt \leq 300 \text{ A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting T_J = 25°C

V _{DS}	R _{DS(ON)} MAX	I _D MAX
-100 V	0.19 Ω @ -10 V	-16.5 A



MARKING DIAGRAM



\$Y = onsemi Logo
 &Z = Assembly Plant Code
 &3 = Data Code (Year & Week)
 &K = Lot Code
 FQP17P10 = Specific Device Code

ORDERING INFORMATION

Device	Package	Shipping
FQP17P10	TO-220-3LD (Pb-Free)	50 Units/Tube

THERMAL CHARACTERISTICS

Symbol	Parameter	Ratings	Unit
$R_{\theta JC}$	Maximum Thermal Resistance, Junction to Case	1.5	°C/W
$R_{\theta CS}$	Thermal Resistance, Case-to-Sink, Typ.	0.5	°C/W
$R_{\theta JA}$	Maximum Thermal Resistance, Junction to Ambient	62.5	°C/W

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
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OFF CHARACTERISTICS

BV_{DSS}	Drain to Source Breakdown Voltage	$V_{GS} = 0 \text{ V}$, $I_D = -250 \mu\text{A}$	-100	-	-	V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = -250 \mu\text{A}$, Referenced to 25°C	-	-0.1	-	V/ $^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = -100 \text{ V}$, $V_{GS} = 0 \text{ V}$	-	-	-1	μA
		$V_{DS} = -80 \text{ V}$, $T_C = 150^\circ\text{C}$	-	-	-10	
I_{GSSF}	Gate-Body Leakage Current, Forward	$V_{GS} = -30 \text{ V}$, $V_{DS} = 0 \text{ V}$	-	-	-100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	$V_{GS} = 30 \text{ V}$, $V_{DS} = 0 \text{ V}$			100	nA

ON CHARACTERISTICS

$V_{GS(\text{th})}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$, $I_D = -250 \mu\text{A}$	-2.0	-	-4.0	V
$R_{DS(\text{on})}$	Static Drain-Source On-Resistance	$V_{GS} = -10 \text{ V}$, $I_D = -8.25 \text{ A}$	-	0.14	0.19	Ω
g_{FS}	Forward Transconductance	$V_{DS} = -40 \text{ V}$, $I_D = -8.25 \text{ A}$	-	9.9	-	S

DYNAMIC CHARACTERISTICS

C_{iss}	Input Capacitance	$V_{DS} = -25 \text{ V}$, $V_{GS} = 0 \text{ V}$, $f = 1.0 \text{ MHz}$	-	850	1100	pF
C_{oss}	Output Capacitance		-	310	400	pF
C_{rss}	Reverse Transfer Capacitance		-	100	130	pF

SWITCHING CHARACTERISTICS

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = -50 \text{ V}$, $I_D = -16.5 \text{ A}$, $R_G = 25 \Omega$ (Note 4)	-	17	45	ns
t_r	Turn-On Rise Time		-	200	410	ns
$t_{d(off)}$	Turn-Off Delay Time		-	45	100	ns
t_f	Turn-Off Fall Time		-	100	210	ns
Q_g	Total Gate Charge	$V_{DS} = -80 \text{ V}$, $I_D = -16.5 \text{ A}$, $V_{GS} = -10 \text{ V}$ (Note 4)	-	30	39	nC
Q_{gs}	Gate-Source Charge		-	4.8	-	nC
Q_{gd}	Gate-Drain Charge		-	17	-	nC

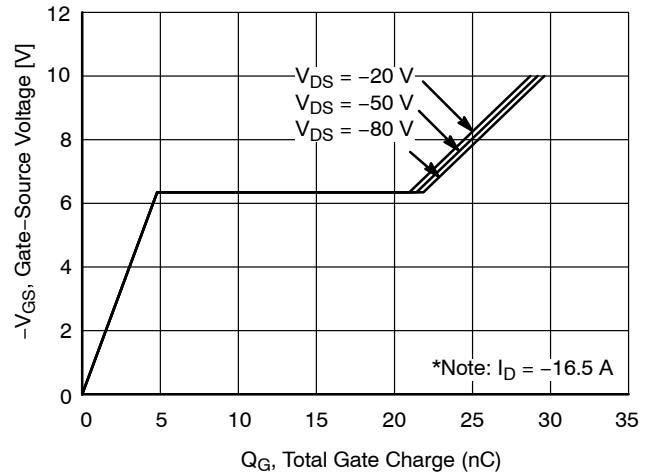
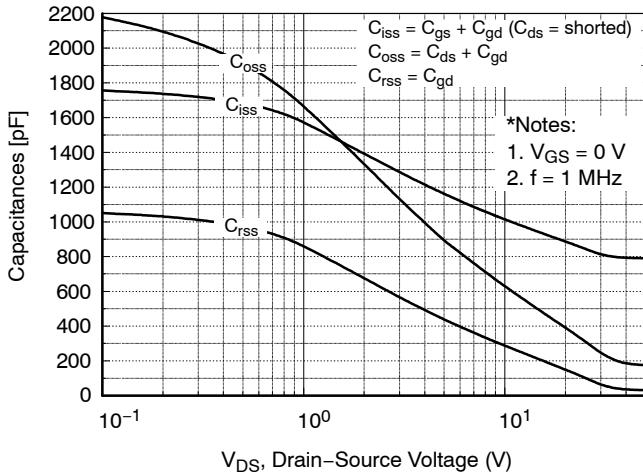
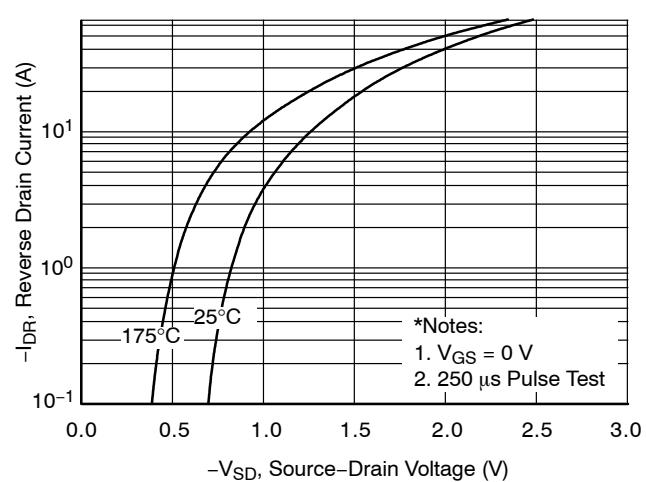
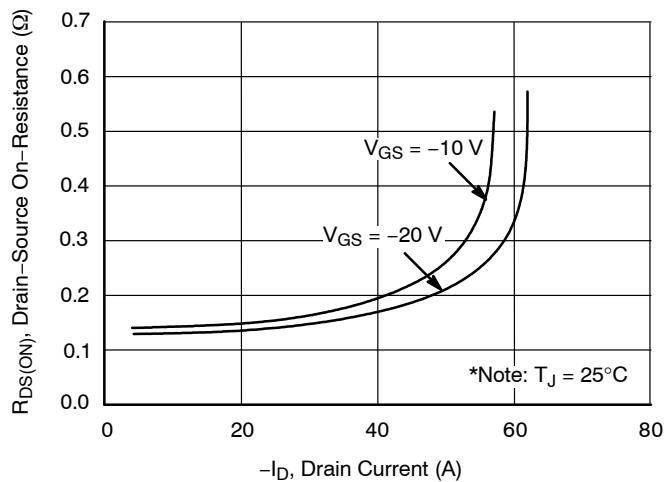
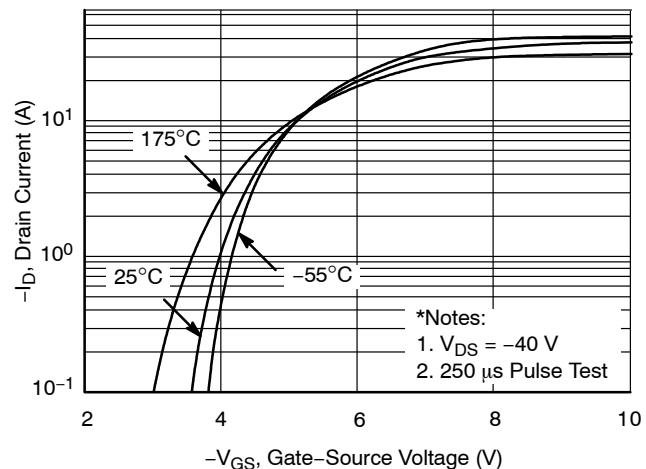
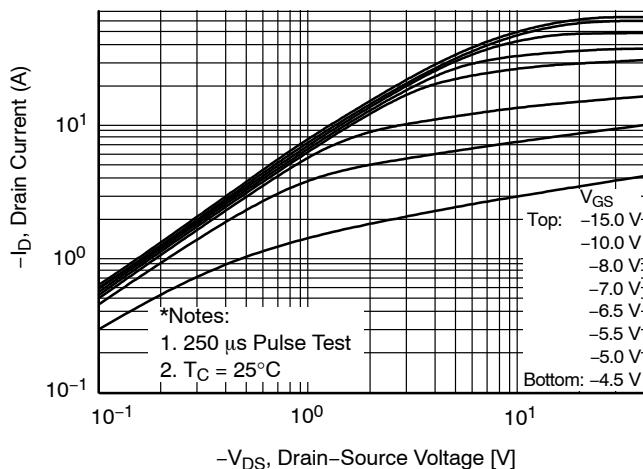
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS

I_S	Maximum Continuous Drain-Source Diode Forward Current	-	-	-16.5	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current	-	-	-66	A
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0 \text{ V}$, $I_S = -16.5 \text{ A}$	-	-	-4.0
t_{rr}	Reverse Recovery Time	$V_{GS} = 0 \text{ V}$, $I_S = -16.5 \text{ A}$, $dI_F/dt = 100 \text{ A}/\mu\text{s}$	-	120	-
Q_{rr}	Reverse Recovery Charge		-	0.52	-

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

4. Essentially independent of operating temperature.

TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS (continued)

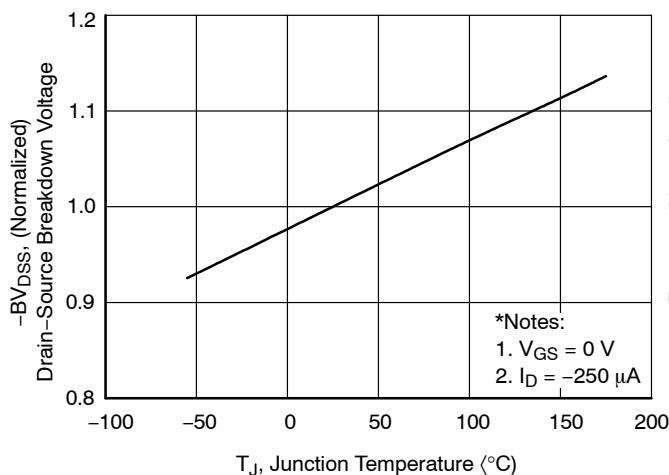


Figure 7. Breakdown Voltage Variation vs. Temperature

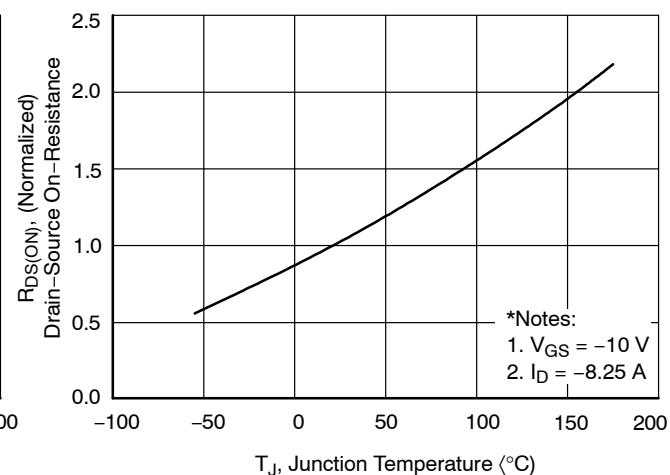


Figure 8. On-Resistance Variation vs. Temperature

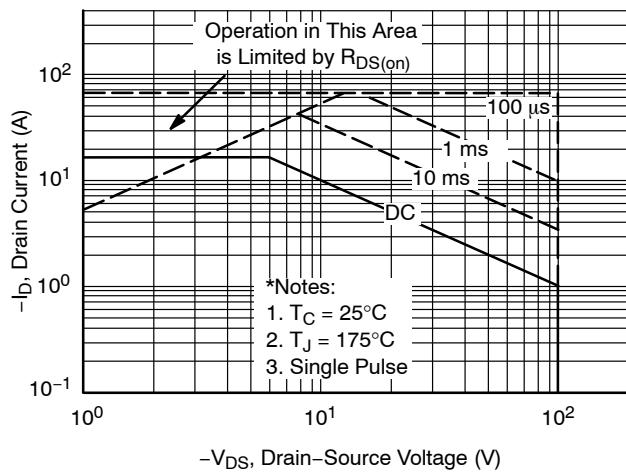


Figure 9. Maximum Safe Operating Area

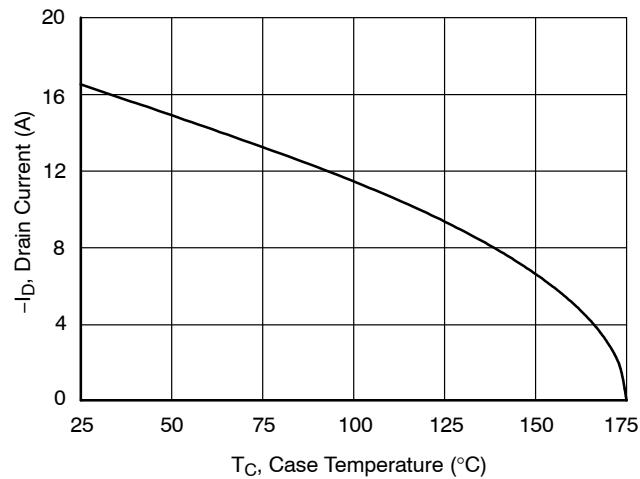


Figure 10. Maximum Drain Current vs. Case Temperature

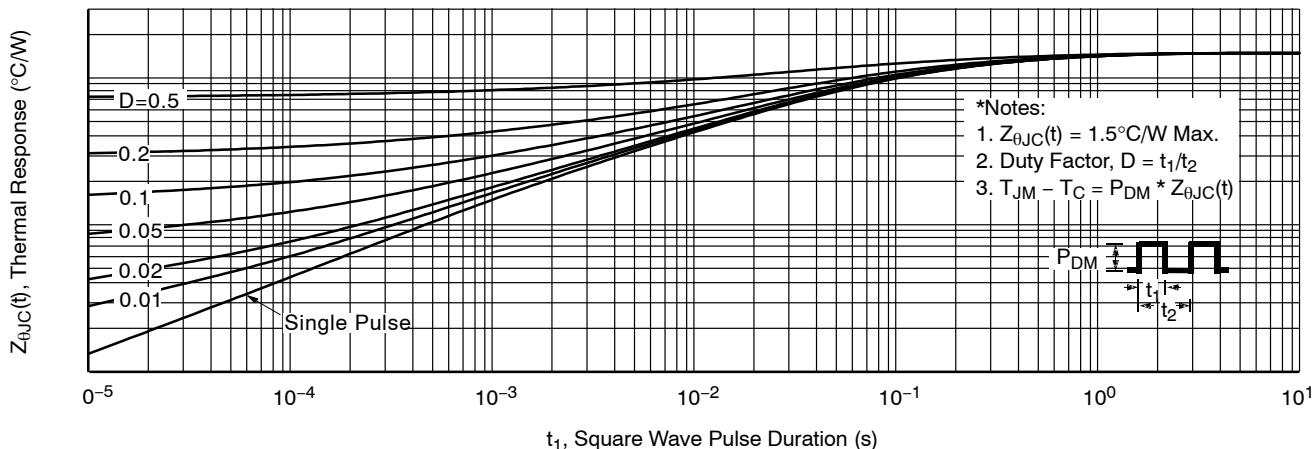


Figure 11. Transient Thermal Response Curve

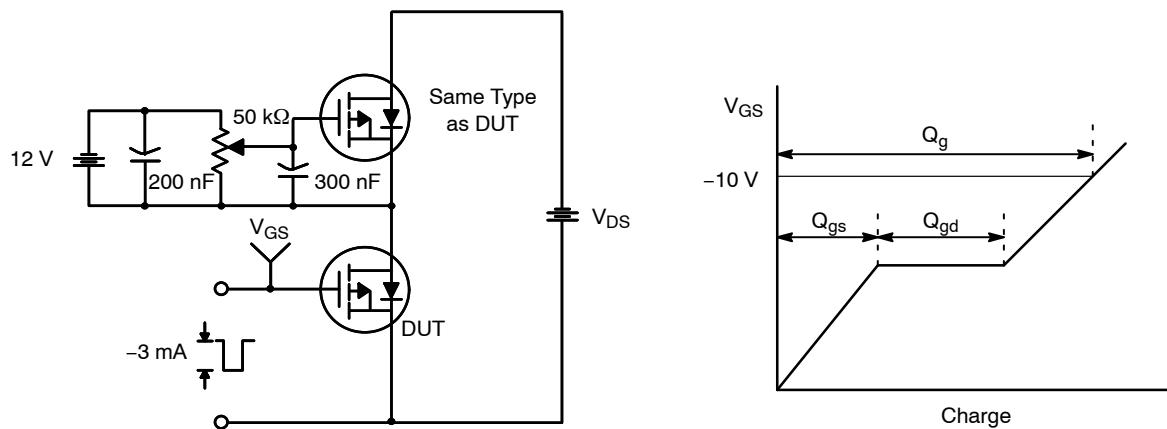


Figure 12. Gate Charge Test Circuit & Waveform

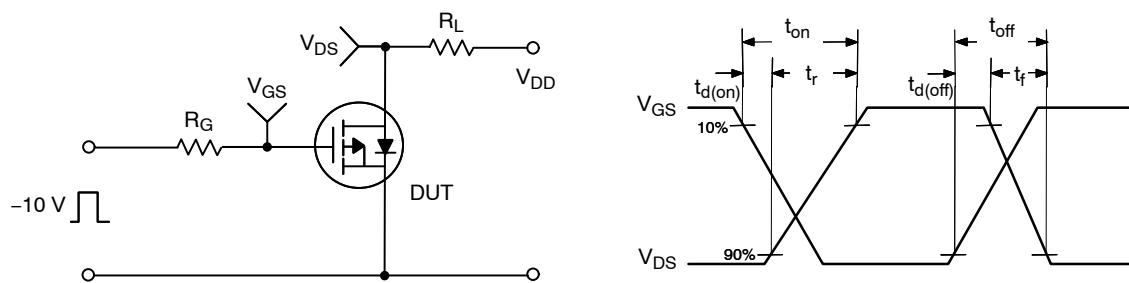


Figure 13. Resistive Switching Test Circuit & Waveforms

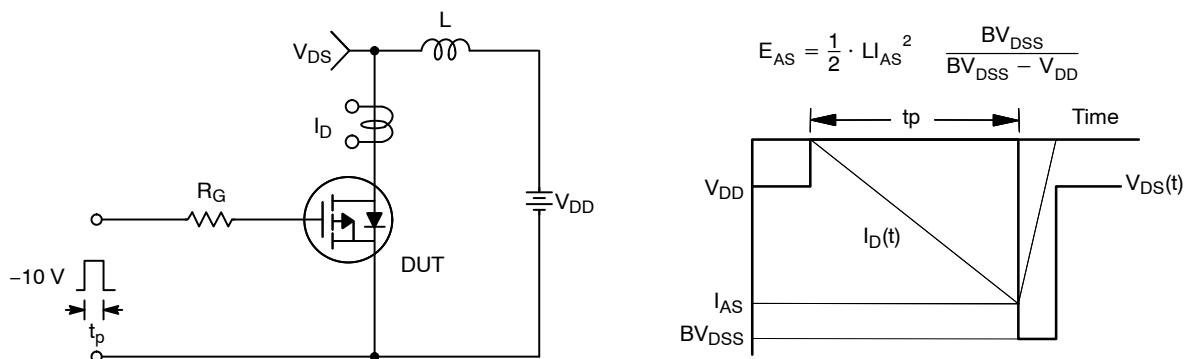


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

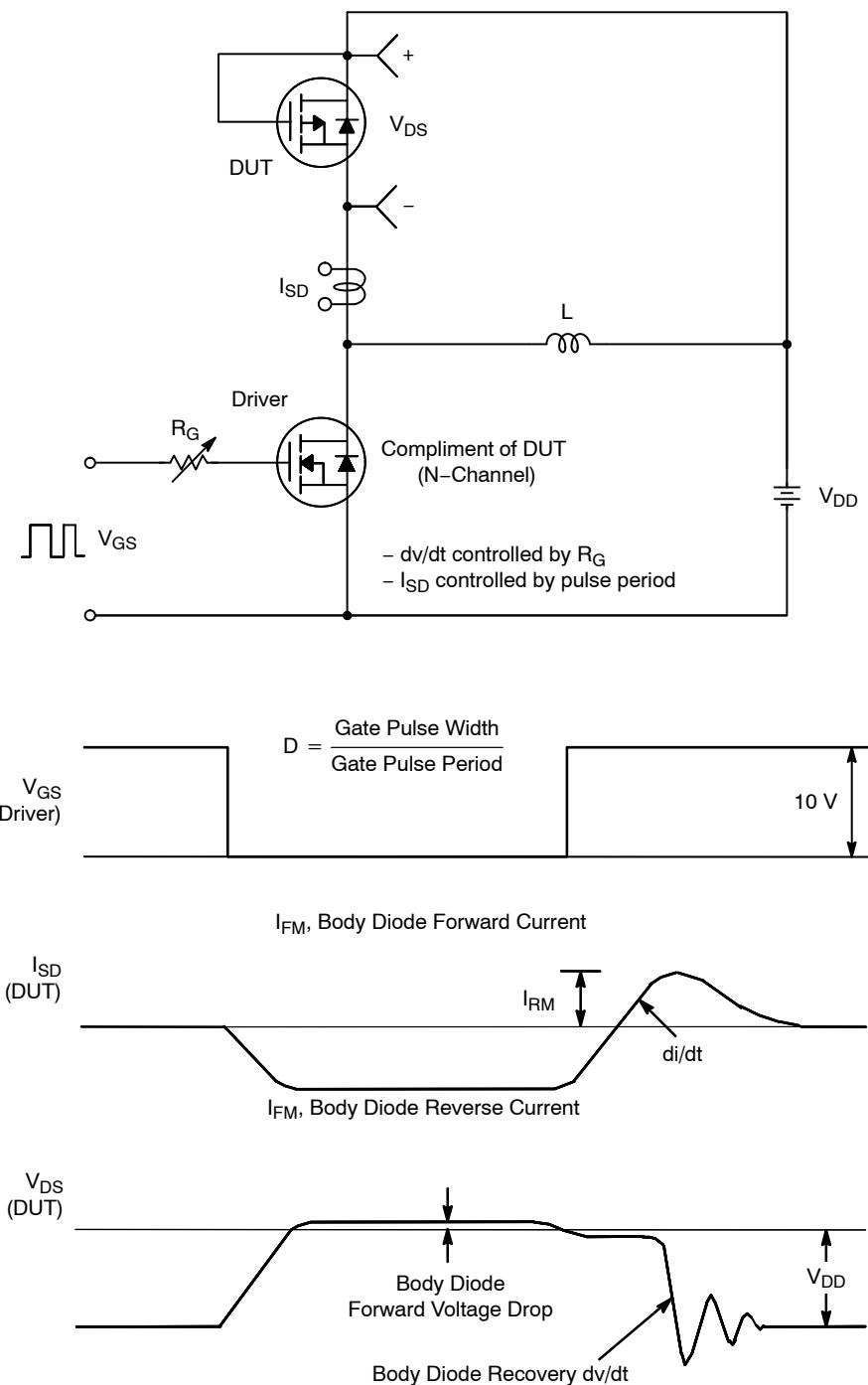
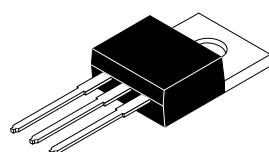


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS

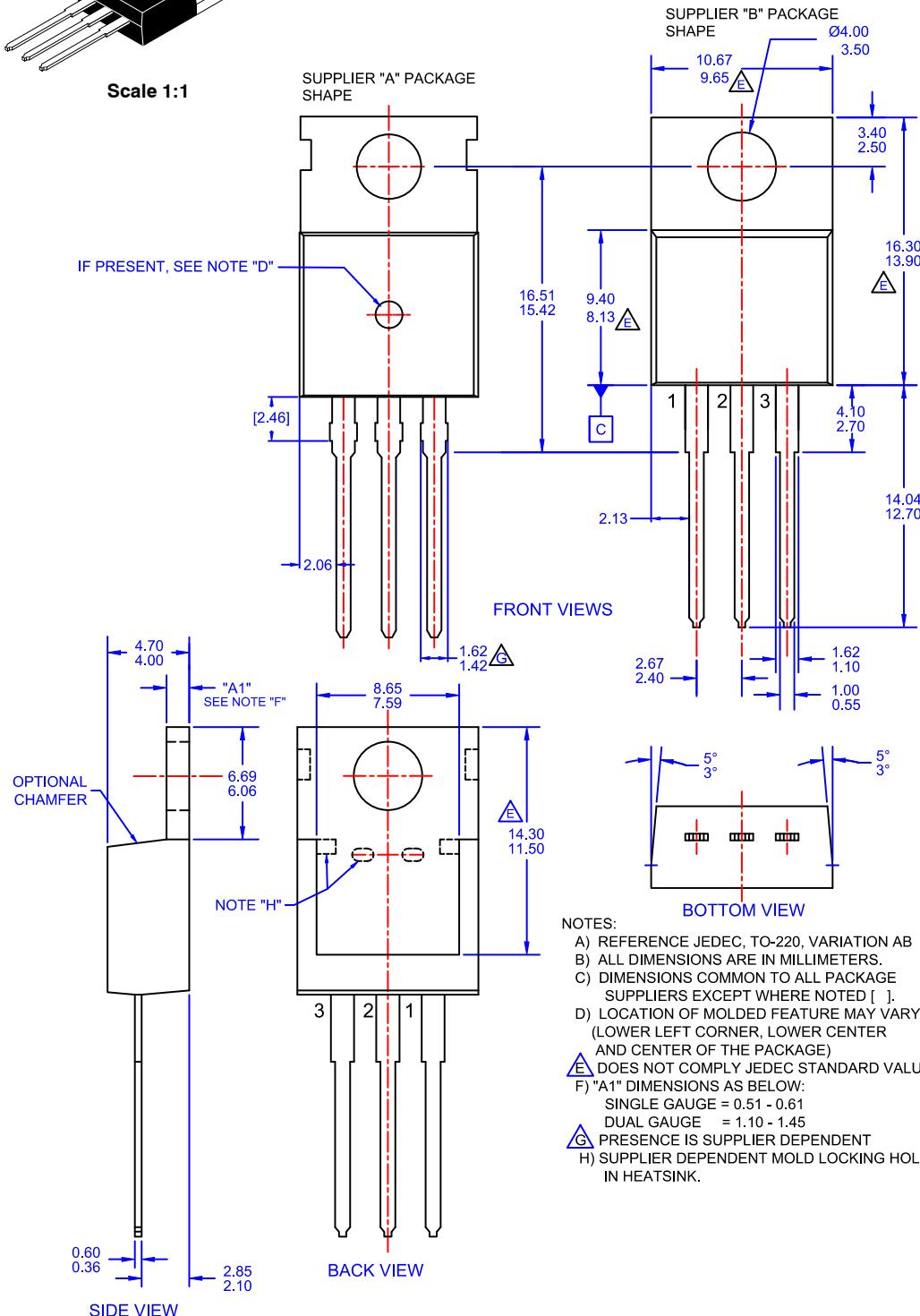
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Scale 1:1

TO-220-3LD
CASE 340AT
ISSUE A

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